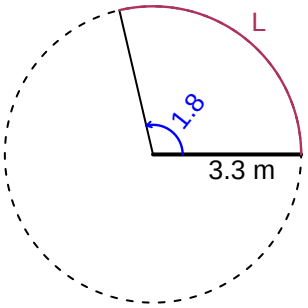
Name: Date:

Trig Final (SLTN v692)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 1.8 radians. The radius is 3.3 meters. How long is the arc in meters?

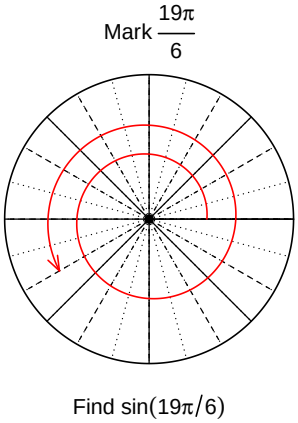


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

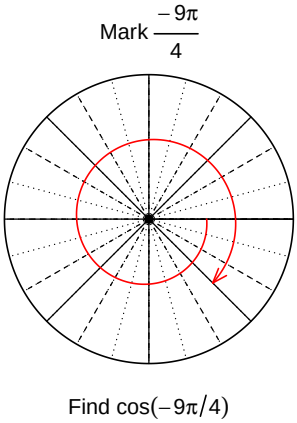
$L = 5.94$ meters.

Question 2

Consider angles $\frac{19\pi}{6}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{19\pi}{6}\right)$ and $\cos\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).



Find sin(19π/6)



Find cos(−9π/4)

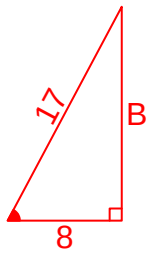
$\sin(19\pi/6) = \frac{-1}{2}$

$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\cos(\theta) = \frac{-8}{17}$, and θ is in quadrant III, determine an exact value for $\tan(\theta)$.

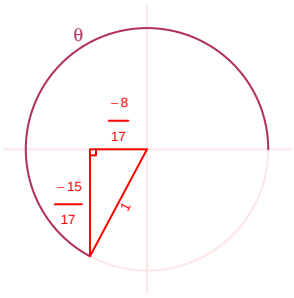
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$8^2 + B^2 = 17^2$$
$$B = \sqrt{17^2 - 8^2}$$
$$B = 15$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\tan(\theta) = \frac{\frac{-15}{17}}{\frac{-8}{17}} = \frac{15}{8}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.56 Hz, an amplitude of 5.75 meters, and a midline at $y = 8.97$ meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -5.75\cos(2\pi 3.56t) + 8.97$$

or

$$y = -5.75\cos(7.12\pi t) + 8.97$$

or

$$y = -5.75\cos(22.37t) + 8.97$$